

LASER CUTTING DEVICE

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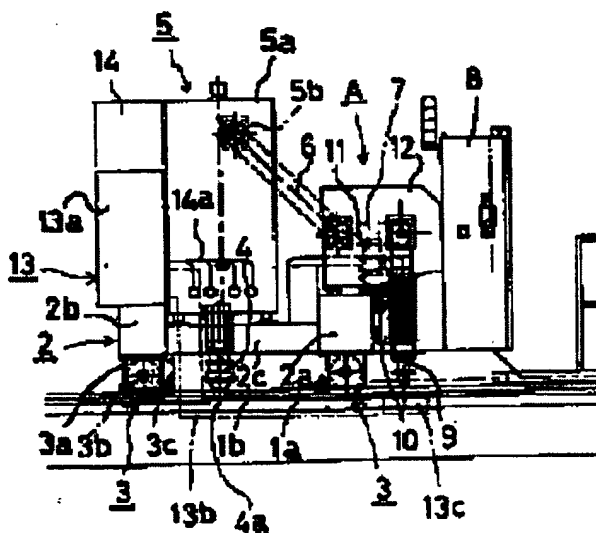
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Inventor: KARUMAI TAKEHIKO
Applicant: KOIKE SANSO KOGYO KK
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Abstract of JP11000778

PROBLEM TO BE SOLVED: To rationally execute cooling of the laser oscillator in a laser cutting device and suction of dust, moreover to lighten the whole device and to realize the smooth operation.

SOLUTION: Two gutters 2a, 2b are arranged in the direction orthogonal to a rail 1a and connected with plural connecting members 2c to constitute a frame 2, and the driven wheel unit 3 having a wheel 3b and a side face wheel 3c is installed to the position corresponding to the rail 1a of gutters 2a, 2b. A laser oscillator 5 is installed to the upper surface of the frame 2, and a dust collector 13 and a cooling unit 14 are arranged to the position corresponding to one side of rail in the side of an emitting port 5b. The laser optical path 6 having an inverting mirror 7 is formed connecting the laser torch 9 mounted on the carriage 10 traversable along the gutter 2a.



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CLAIMS

[Claim(s)]

[Claim 1] It is laser cutting equipment which runs the rail top of the pair which was laid in parallel and fixed the rack to the side face, irradiate laser light and cuts it to sections-ed. It has the frame which connected and constituted said garter by two or more connection members while having arranged two garters in the direction which intersects perpendicularly to said rail. Are on the connection member which constitutes said frame, make one garter approach, and as outgoing radiation opening of laser light inclines toward an edge side from the center of a garter, it arranges a laser oscillation machine. While carrying a laser torch in the garter of another side and arranging the carriage which can be overrun along with this garter And arrange the reversal member which has the mirror of the pair which only one half of the distance of the infestation distance of carriage moves, and a laser optical path is formed along with the mirror of this another side. the infestation direction and this direction of said carriage -- Furthermore, laser cutting equipment which is on a frame and is characterized by having carried out proximal to this dust collector, and having arranged the refrigeration unit while having arranged the dust collector in the location corresponding to the rail by the side of outgoing radiation opening of a laser oscillation machine.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the laser cutting equipment which can demonstrate the dust collection engine performance stabilized by carrying a dust collector and a refrigeration unit, and the cooling engine performance.

[0002]

[Description of the Prior Art] Since it is not concerned but laser light can be cut in the quality of the material of sections-ed with the laser cutting equipment irradiated and cut at sections-ed, it is used in the large industry. Cutting capacity increases with the increment in the output of a laser oscillation machine, the manufacturer who cuts a thick plate comparatively is also being employed, and two or more laser cutting equipments are working in current.

[0003] The structure of laser cutting equipment where the laser oscillation machine with the above-mentioned large output was used is explained briefly. Drawing 4 R> 4 is drawing explaining the configuration of typical laser cutting equipment. In drawing, the rails 51a and 51b of a pair are laid in parallel, and laser cutting equipment is laid in these rails 51a and 51b possible [transit].

[0004] Laser cutting equipment has the engine frame 52 constituted by rigid member 52c which connects garter 52b to which truck 52a connection of truck 52a arranged on rail 51a and one edge is done, and the other-end section reaches on rail 51b, and truck 52a and garter 52b, and raises rigidity. Truck 52a has rigidity high enough by itself, it has the frame with which the inferior surface of tongue was opened wide, and two wheels 53 and the drive motor which is not illustrated are attached in this frame. Moreover, the same wheel 53 also as the edge side of garter 52b is attached.

[0005] The laser oscillator 54 is laid in the upper part of truck 52a, and the carriage 56 which carries the laser torch 55 in garter 52b, and move along with this garter 52b is formed. And the laser torch 55 is connected to the laser oscillator 54, and the laser optical path 57 is formed. In addition, 58 is a control panel.

[0006] The function in which truck 52a pays the load of the laser oscillation machine 54 with the above-mentioned laser cutting equipment, The function to transmit driving force while supporting these loads by fixing the end of rigid member 52c while fixing the end of garter 52b, And while being formed with a dimension long enough along with rail 51a, it has the function to guarantee the precision of the migration direction by using this rail 51a as a guide. For this reason, the vertical direction and the horizontal force will act on truck 52a, and it is constituted with high rigidity.

[0007] While outgoing radiation of the laser light is carried out from the laser oscillation machine 54 and cutting sections-ed, the laser oscillation machine 54 is cooled with cooling water. After said cooling water flows back to the refrigeration unit installed on the floor through the hose and performs heat exchange in this unit, it is again supplied to a laser oscillation machine. Moreover, since dust and smoke occur with activation of cutting to sections-ed, while preparing a duct along with a rail, there are some which were constituted so that a dust collector might be installed on a floor and dust and smoke might be attracted.

[0008]

[Problem(s) to be Solved by the Invention] With the constituted laser cutting equipment, the refrigeration unit is connected with the laser oscillation machine with two or more hose like the above. For this reason, a hose will be dragged by laser cutting equipment and has the problem of becoming the resistance to this cutting equipment and affecting driving force and precision. When the output of a laser oscillation machine increases especially, the refrigeration capacity by one set of a refrigeration unit is inadequate, and the need that a laser oscillation machine is cooled using two sets of refrigeration units arises. In this case, the number of hose will also increase with the increment in the number of installation of a refrigeration unit, and many problems in accordance with towage of the hose by laser cutting equipment arise.

[0009] Moreover, there is a problem that it is indispensable to raise a dust collection fan's capacity with the increment in the construction length of a rail when collecting dust for the dust generated at the time of cutting, and it is difficult for loss of a duct to change according to change of the distance from a dust collector to laser cutting equipment, and to maintain the fixed dust collection engine performance.

[0010] The purpose of this invention is arranging a refrigeration unit and a dust collector on a frame, and is to offer the laser cutting equipment which does not need to lead a hose and can always demonstrate the fixed dust collection engine performance.

[0011]

[Means for Solving the Problem] The laser cutting equipment applied to this invention in order to solve the above-mentioned technical problem is laser cutting equipment which runs the rail top of the pair which was laid in parallel and fixed the rack to the side face, irradiates laser light and cuts it to sections-ed. It has the frame which connected and constituted said garter by two or more connection members while having arranged two garters in the direction which intersects perpendicularly to said rail. Are on the connection member which constitutes said frame. make one garter approach, and as outgoing radiation opening of laser light inclines toward an edge side from the center of a garter, it arranges laser oscillation machine. While carrying a laser torch in the garter of another side and arranging the carriage which can be overrun along with this garter And arrange the reversal member which has the mirror of the pair which only one half of the distance of the infestation distance of carriage moves, and a laser optical path is formed along with the mirror of this another side. the infestation direction and this direction of said carriage -- Furthermore, it is on a frame, and while arranging a dust collector in the location corresponding to the rail by the side of outgoing

radiation opening of a laser oscillation machine, proximal is carried out to this dust collector, and a refrigeration unit is arranged and it is constituted.

[0012] Connect two garters by two or more connection members, and a frame is constituted from above-mentioned laser cutting equipment. While this frame is constituted arranges a laser oscillation machine, as a garter is made to approach and outgoing radiation opening of laser light is inclined toward the edge side of a garter. By and the thing for which a reversal member is arranged while arranging possible [infestation of the carriage which carried the laser torch in the garter of another side] The migration stroke of a reversal member can be guaranteed by being able to constitute a laser optical path between a laser oscillation machine and the garter of another side, facing arranging a laser oscillation machine further, and biasing outgoing radiation opening of laser light toward the edge side of a garter. namely, a reversal member -- the infestation direction and this direction of carriage -- and since it moves in one half of the distance of the migration length of carriage, it is biasing outgoing radiation opening of laser light toward one edge side, and the migration length of said reversal member can be guaranteed.

[0013] Moreover, since proximal was carried out to this dust collector and the refrigeration unit has been arranged while being on a frame and having arranged the dust collector in the location corresponding to the rail by the side of outgoing radiation opening of the laser light in a laser oscillation machine Since it is not concerned with the transit location of laser cutting equipment, but the distance from a dust collector to a laser torch can become fixed, and the stable dust collection engine performance can be demonstrated and cooling to a laser oscillator and a laser torch can be completed on a frame, it is not necessary to drag a hose.

[0014]

[Embodiment of the Invention] Hereafter, the desirable operation gestalt of the above-mentioned laser cutting equipment is explained using drawing. The top view of the laser cutting equipment which drawing 1 requires for this example, and drawing 2 are front views, the II-II view Fig. of drawing 1 and drawing 3 are side elevations, and it is drawing 1 R> 1. III-III It is a view Fig.

[0015] In drawing, laser cutting equipment A is constituted so that it can run by being laid on rail 1a of the pair which was laid in parallel and fixed rack 1b to the outside field, respectively. It has the frame 2 formed in the shape of a ladder by connecting by two or more connection member 2c while laser cutting equipment A arranges two garter 2a and 2bs in the direction which intersects perpendicularly to rail 1a. While attaching the coupled driving wheel unit 3 in rail 1a of this frame 2, and a corresponding location, the drive motor 4 was attached in rack 1b and a corresponding location, and the laser oscillation machine 5, the dust collector 13, and the refrigeration unit 14 are further arranged on the top face.

[0016] Two garter 2a which constitutes a frame 2, and 2b do not need to have the same specification, and are formed with the dimension according to the load which should be paid, the dimension of the components which should be attached, etc. In this example, the direction of garter 2a has the larger dimension than garter 2b. Moreover, especially the number of garter 2a and connection member 2c which connects 2b is not limited.

[0017] In a frame 2, the rail 1a lay length set up with each garter 2a, the width method of 2b, and the die-length dimension of connection member 2c is set up in consideration of the dimension of the reversal mirror 7 grade arranged by the width method and the laser optical path 6 mentioned later of the laser oscillation machine 5 carried in this frame 2, the dimension of a control panel 8, etc. Furthermore, a frame 2 is constituted with sufficient rigidity to prevent or absorb vibration with a possibility of generating at the time of high-speed transit, and support the load of the laser oscillation machine 5.

[0018] The coupled driving wheel unit 3 is attached in each garter 2a, rail 1a of 2b, and a corresponding location. That is, the coupled driving wheel unit 3 is attached in four places of a frame 2, respectively. This coupled driving wheel unit 3 consists of side-face wheel 3c which is supported by bracket 3a pivotable and contacts each garter 2a, bracket 3a which fixes in the predetermined location of 2b, and wheel 3b which is supported by bracket 3a pivotable and contacts the top face of rail 1a on the side face of rail 1a, and one pair of side-face wheel 3c is prepared on both sides of rail 1a.

[0019] Since side-face wheel 3c contacts the location fully isolated in the direction which is each side face of rail 1a of a pair, and met rail 1a, the frame 2 which attached the coupled driving wheel unit 3 in each garter 2a and 2b can realize smooth and high transit of precision.

[0020] The drive motor 4 is formed in the location corresponding to each garter 2a and rack 1b which is between 2bs and fixed to rail 1a. Pinion 4a has fixed to this drive motor 4, and this pinion 4a has geared to rack 1b. Therefore, it is possible to make it run a frame 2 (laser cutting equipment A) along with rail 1a by controlling rotation of a drive motor 4.

[0021] The laser oscillation machine 5 is arranged as it is in the location where body section 5a was laid on connection member 2c in while the longitudinal direction had been arranged in the direction which intersects perpendicularly with rail 1a, and outgoing radiation opening 5b of laser light inclined in which direction from the center of the effective cutting width of face in laser cutting equipment A.

[0022] The laser optical path 6 is formed by making outgoing radiation opening 5b of the laser oscillation machine 5 into the starting point. The reversal mirror 7 for this laser optical path 6 being formed between the laser oscillator 5 and the laser torch 9, and not being concerned with the location of the laser torch 9 in a frame 2, but maintaining uniformly the distance between this torch 9 and the laser oscillator 5 is formed.

[0023] The laser torch 9 is carried in the carriage 10 formed possible [infestation] along with garter 2a which constitutes a frame 2. Therefore it is possible to make it overrun in the direction which intersects perpendicularly to rail 1a along with garter 2a by controlling rotation of the horizontal drive motor 11 formed in carriage 10.

[0024] Since it is constituted so that carriage 10 may overrun along with garter 2a, the laser optical path 6 is also formed using garter 2a. That is, the laser optical path 6 is formed so that it may be reversed by return and the reversal mirror 7 to the opposite direction of this oscillator 5 along with outgoing radiation opening 5b to garter 2a of the laser oscillation machine 5, it may turn along with garter 2a in the direction of outgoing radiation opening 5b of the laser oscillation machine 5 again and incidence can be carried out to the laser torch 9. And the reversal mirror 7 is constituted so that it can move with one half of the movement magnitude of the movement magnitude of carriage 10 along with garter 2a.

[0025] In addition, although two laser torches 9 are drawn on drawing 1 and drawing 2, this is indicated for convenience, in order to show the location of the reversal mirror 7 when one laser torch 9 is located in the both ends of effective cutting to sections-ed, and consists of laser cutting equipment A of this example using one laser torch 9.

[0026] Therefore, moving the laser torch 9 carried in carriage 10 by controlling rotation of the drive motor 4 formed in the frame 2 and the

horizontal drive motor 11 formed in carriage 10 two-dimensional, while irradiating laser light towards the sections-ed which are not illustrated from this torch 9, it is possible to cut in a desired configuration by making an assist gas inject.

[0027] NC control unit which carry out numerical control (NC) of the laser cutting equipment A be build into the control panel 8, after input information, such as the quality of the material of sections-ed, and thickness, and the information on a graphic form which should be cut and perform a blank layout by control panel 8a, the outgoing radiation of laser light with a motor 4 and the horizontal drive motor 11, and the laser oscillation machine 5 etc. be suitably control by start a drive, and, thereby, cutting to sections-ed be carry out. In addition, in drawing, 12 is covering made of a wrap cloth about the laser optical path 6.

[0028] A dust collector 13 attracts the dust generated with cutting of sections-ed, raises work environment, and is arranged in the location corresponding to rail 1a by the side of outgoing radiation opening 5b of the laser oscillation machine 5 of a frame 2. This dust collector 13 has body of equipment 13a fixed on garter 2b which constitutes a frame 2, and duct 13b installed along with the frame 2 from this body 13a, and is prepared at the tip of duct 13b so that suction opening 13c may counter with the laser torch 9.

[0029] Like the above, it is possible by arranging a dust collector 13 on a frame 2 to perform suction which the distance from this dust collector 13 to the laser torch 9 became fixed, therefore the loss in duct 13b at the time of dust collector 13 actuation became fixed, and was always stabilized.

[0030] A refrigeration unit 14 exchanges the heat which supplies cooling water to the laser oscillation machine 5, and is generated at the time of actuation of this oscillator 5. This refrigeration unit 14 is on garter 2b which constitutes a frame 2, and proximal [of it] is carried out to a dust collector 13, and it is arranged. Therefore, a refrigeration unit 14 is arranged at the outgoing radiation opening 5b side of the laser oscillation machine 5, and supply of cooling water and two or more hose 14a for return are connected between these laser oscillation machine 5.

[0031] Like the above, by arranging a refrigeration unit 14 on a frame 2, the distance of this unit 14 and the laser oscillation machine 5 becomes very short, and the loss in hose 14a becomes uniformly small. Therefore, it becomes possible to raise the cooling effectiveness by the refrigeration unit 14.

[0032]

[Effect of the Invention] As explained to the detail above, while arranging two garters with the laser cutting equipment concerning this invention in the direction which intersects perpendicularly to a rail, it connects by two or more connection members, and a frame is constituted and the coupled driving wheel unit is attached in the location corresponding to the rail of each garter. For this reason, since the side-face wheel which constitutes a coupled driving wheel unit contacts the side face of a rail and shows around in four locations corresponding to the separation of each garter, smooth transit of laser cutting equipment is realizable.

[0033] Moreover, since proximal was carried out to this dust collector and the refrigeration unit has been arranged on a frame while having arranged the laser oscillation machine to a garter and parallel, biasing outgoing radiation opening toward one side rather than the center of a garter and having arranged the dust collector to said outgoing radiation opening side, the longitudinal direction of a frame will be made to distribute a laser oscillation machine, a dust collector, and a refrigeration unit, it will arrange, and these loads can be rationally paid with the whole frame. Therefore, it is not necessary to form a truck like the conventional engine frame of what needs to raise the rigidity of a frame, and lightweight-ization as the whole laser cutting equipment can be achieved.

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